The SensaScope® - a new hybrid video intubation stylet

Biro, P

Abstract: The recently developed SensaScope(®) is a hybrid intubation endoscope that has been designed and developed according to our clinical requirements for a safe, easy-to-handle, and effective video-assisted intubation. The attribute "hybrid" derives from the fact that the shaft of the instrument is combined by both, rigid and flexible parts. Its S-shaped rigid segment enables a very intuitive handling by one hand only, thus leaving the left hand free to operate a conventional laryngoscope. The tip of the device can be controlled via a steering handle in a similar fashion as fiberoptic endoscopes. Due to these attributes, the SensaScope(®) became a very versatile and effective tool to master the unanticipated difficult intubation in anesthetized and paralyzed patients. For this reason, in our institution it has been included as the first-line technique into our local failed intubation algorithm. The first clinical experience with the device and its standardized technique of use produced encouraging results; the success rate for novices was found to be at 97% (in 194 of 200 patients) of all intubation attempts in both patients categories: those who were rated as having normal (84.5%) and in those showing difficult intubation conditions (15.5%). The technical development, the way of using the device, the suitable indications, and limitations are discussed here.

DOI: https://doi.org/10.4103/1658-354X.87271

Originally published at:
Biro, P (2011). The SensaScope® - a new hybrid video intubation stylet. Saudi Journal of Anaesthesia, 5(4):411.
DOI: https://doi.org/10.4103/1658-354X.87271

ISSN 1658-354X

PubMed Indexed

Saudi Journal of Anaesthesia

Official Publication of The Saudi Anaesthetic Association

October-December 2011 / Vol 5 / Issue 4

SJA

www.saudija.org

Medknow Publications

The SensaScope® - A new hybrid video intubation stylet

Peter Biro

Institute of Anaesthesiology, University Hospital Zurich, CH Zurich, Switzerland

ABSTRACT

The recently developed SensaScope® is a hybrid intubation endoscope that has been designed and developed according to our clinical requirements for a safe, easy-to-handle, and effective video-assisted intubation. The attribute "hybrid" derives from the fact that the shaft of the instrument is combined by both, rigid and flexible parts. Its S-shaped rigid segment enables a very intuitive handling by one hand only, thus leaving the left hand free to operate a conventional laryngoscope. The tip of the device can be controlled via a steering handle in a similar fashion as fiberoptic endoscopes. Due to these attributes, the SensaScope® became a very versatile and effective tool to master the unanticipated difficult intubation in anesthetized and paralyzed patients. For this reason, in our institution it has been included as the first-line technique into our local failed intubation algorithm. The first clinical experience with the device and its standardized technique of use produced encouraging results; the success rate for novices was found to be at 97% (in 194 of 200 patients) of all intubation attempts in both patients categories: those who were rated as having normal (84.5%) and in those showing difficult intubation conditions (15.5%). The technical development, the way of using the device, the suitable indications, and limitations are discussed here.

Key words: *Intubation, regular, difficult, video-assisted, SensaScope®*

Address for correspondence:
Dr. Peter Biro,
Institute of Anaesthesiology, University Hospital Zurich, Raemistr. 100, CH-8091, Zurich, Switzerland,
E-mail: peter.biro@usz.ch

PURPOSE AND FIRST EXPERIENCES

Since the first prototype of the SensaScope® (Acutronic Medical Systems AG, Hirzel, Switzerland) was released in 2006,[1] it has been extensively used in our department in hundreds of elective cases. An approval of the institutional ethics committee for the clinical use of the equipment in surgical patients (with informed consent in elective cases and without informed consent in emergency cases) has been obtained. Due to direct laryngoscopy which is part of the standardized technique in use, the laryngoscopic view of the larynx can be compared to the endoscopic view in the same patient by the same operator. To obtain a first estimation of success rate, we found in the first 200 uses of the device 6% of direct laryngoscopic laryngeal views with grade 3 or 4 according to the Cormack and Lehane classification.[2] This corresponds well with the reported frequency of difficult larnygoscopy in the literature.[3] In 294 patients, intubation was easily performed with the SensaScope®, which always delivered a full endoscopic view of the glottis (grade 1 according the Cormack and Lehane classification) as well as of the entire intubation pathway during the advancement of the scope. In two cases, a posteriorly adherent epiglottis that could not be elevated from the posterior pharyngeal wall necessitated a somewhat different approach. The endoscope had do be advanced first into the esophagus and the view to the glottis could only be achieved while slowly retracting the device strictly in midline with a slightly elevated tip. In these cases, intubation lasted more than 60 s, but could be completed in less than 2 min. An intubation duration >60 and <120 s occurred in other four patients, where abundant secretions fogged the optic and required suction and a brief cleaning of the instrument's tip. In no patient, pulsoximetric saturation fell below 90% or any other airway-related problem occurred. However, these observations certainly need to be substantiated by further prospective investigations. By now, they at least indicate the high probability that the device is a useful tool in the management of both the regular and the difficult intubation.

Access this article online	
Quick Response Code:	Website: www.saudija.org
	DOI: 10.4103/1658-354X.87271

LIMITATIONS OF THE DEVICE

As any other endoscopic instrument, the SensaScope® requires space to provide an image on the video screen. The inability to elevate the tongue base (e.g., after extensive operations in the mouth floor region or radiation therapy) or abundant secretions, bleeding, or vomiting preclude its use, and nonvisualizing means of airway securing should be chosen instead. Also reduced mouth opening to less than 2 cm might be a hindrance; however, as for the regular technique, a distance allowing the passing of a laryngoscope blade is sufficient to apply the SensaScope® which is less than necessary for conventional intubation. We have encountered difficulties in intubation with the SensaScope® only in two patients with posteriorly adherent epiglottis, a problem that could be solved with a specific technique by first advancing the scope into the esophagus and secondarily retracting it till the laryngeal entrance appeared on the screen.

THE NEW "STAND ALONE" SENSASCOPE®

As a result of 2 years of development and testing of intermediate prototypes, a "stand-alone"-type SensaScope® has been created which does not have anymore to be combined with an external light source and video camera unit. This version is composed of the endoscope with an inbuilt camera and a light source that has to be only connected to the video monitor via a connecting interface in a small box. The new SensaScope® has no eyepiece anymore and instead of two heavy cables (one for the video signal and another for the cold light), there is only a lean cable to the video interface. By becoming lighter and having only one slender cable, the maneuverability and comfort of the use increased considerably. A more important benefit of this modification resulted in a grossly improved image quality on the monitor. The shape of the image is now rectangular and completely fills the screen of the monitor as compared with the relatively small circular image in the middle of the video screen derived from the attached camera. Even more impressive is the difference in the image resolution; in the old prototype, the image was composed by a fiberoptic bundle that presented the usual unsubtle pixels, while the new device provides a brilliant image quality [Figure 1].

The most important advantage of the new SensaScope® is the ease of handling. The early "modular" version had to be connected to the light source and the camera had to be attached to the eyepiece. This was followed by searching for the right focus, finding the correct axial alignment, and acquiring the white balance. Even with gaining routine by repeated use, these preparations needed up

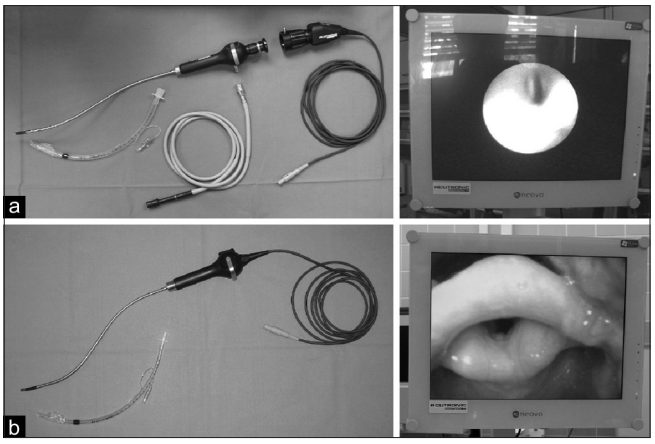

Figure 1: (a) The earlier modular SensaScope® with its components (left) and the monitor view that it can provide (right); (b) the new stand-alone SensaScope® (left) and its monitor view (right)

to 3 min, which in unexpected difficult airway situations may cause a relevant delay in solving the problem. The new SensaScope® became lightweight and simple to use. To operate the system, one only has to connect the sole cable to the video interface and to press the start button. Then the system is ready to use. The light intensity can be modified with a plus/minus switcher which is included in both the handle of the stylet and in the video interface. This feature might be especially relevant in the prehospital use of the device, where light conditions might be very variable and eventually less favorable.

WHAT REMAINS UNCHANGED?

The intubation technique as described in the first publication remains unchanged.[1] In particular, it has to be emphasized that the proper use of the device requires direct laryngoscopy. In the anesthetized and paralyzed patient lying in a supine position, the hypopharynx is occluded and there is no free space to enable viewing with an endoscopic device. Thus, elevation of the base of the tongue is mandatory, even if a direct laryngoscopic view cannot be achieved. The exact definition of the actually accepted indication for the SensaScope® in our institution is "the unexpected difficult intubation in anesthetized and paralyzed patients who cannot be expected to return to wakefulness and spontaneous ventilation in due time and who require a secure airway."

WHAT IS PROBABLY GOING TO COME NEXT?

The observed ease of visualization of the glottis even under difficult direct laryngoscopy situations leads to the assumption that the SensaScope® might also be suitable to deal with the expected difficult airway. In this case it would challenge the actually established priority of the flexible

fiberoptic intubation, which is justifiably recognized as the gold standard.[4,5] A first confirmation of this assumption has recently been found by Greif *et al*. who successfully have used the device in 13 cases of expected or even confirmed difficult airway, while adopting an awake or slightly sedated approach.[6] While at this moment, the suitability of the flexible fiberoptic endoscope in awake or lightly sedated patients who still have spontaneous breathing remains unquestioned, the SensaScope® might compete and eventually replace it in the elective anesthetized fiberoptic intubation. This assumption is not only based on several cases that occurred to us accidentally and were easily mastered with the SensaScope®, but also on the plausibility of the fact that a predominantly rigid stylet can be handled in a more intuitive way than a floppy device, where the tip does not automatically follow movements exerted at its proximal end. In contrast, no such statement can be made concerning the awake intubation with the SensaScope®, since until now there is no such experience available.

Another possible, and yet to be tested indication of the SensaScope® could be the rapid sequence induction, where a higher probability of success might be expected if the whole procedure happens under fully visualized conditions, independently of the quality of the resulting direct laryngoscopic view.

Recently, a protective waterproof sleeve (SensaSleeve™, Acutronic Medical Systems AG, Hirzel, Switzerland) became available, which can be mounted on the SensaScope® covering its entire shaft. When covered by the sleeve, the endotracheal tube has to be treated with a silicone spray in order to allow smooth railroading. The tip of the sleeve is transparent and when it closely adheres to the scope tip, the image quality as well as the light intensity remains nearly unaffected. With this configuration, after use, the SensaScope® must not anymore be immersed into a disinfectant for 45 min; after careful removal of the sleeve, a quick swabbing of the shaft with disinfectant-moistened gauze is sufficient. However, such a single-use sleeve costs about 18 $ and the user has to decide whether he should save the costs of a sleeve or the 45-min time and effort for a regular disinfection cycle.

In conclusion, we can state that based on the available experience with intubations of regular and difficult cases with the SensaScope®, there is a strong sign that this device is well suitable for the management of the unexpected difficult intubation. Additionally, there is a certain outlook of extending the indications to other scenarios such as the elective anesthetized fiberoptic intubation in patients with a suspected airway difficulty but possible face mask ventilation. Another possible beneficial use might be in the rapid sequence intubation where the availability of a continuous visualization of the intubation pathway and the resulting location of the endotracheal tube might be beneficial.

REFERENCES

1. Biro P, Battig U, Henderson J, Seifert B. First clinical experience oftracheal intubation with the SensaScope, a novel steerable semirigid video stylet. Br J Anaesth 2006;97:255-61.
2. Cormack RS, Lehane J. Difficult tracheal intubation in obstetrics. Anaesthesia 1984;39:1105-11.
3. Adnet F, Baillard C, Borron SW, Denantes C, Lefebvre L, Galinski M, *et al*. Randomized study comparing the "sniffing position" with simple head extension for laryngoscopic view in elective surgery patients. Anesthesiology 2001;95:836-41.
4. Biro P, Spahn DR. The difficult intubation drill at the University Hospital Zurich. J Rom Anest Terap Jntens 2009;16:147-53.
5. Popat M. The airway. Anaesthesia 2003;58:1166-71.
6. Greif R, Kleine-Brueggeney M, Theiler L. Awake tracheal intubation using the Sensascope in 13 patients with an anticipated difficult airway. Anaesthesia 2010;65:525-8

How to cite this article: Biro P. The SensaScope® - A new hybrid video intubation stylet. Saudi J Anaesth 2011;5:411-3.
Source of Support: Nil, **Conflict of Interest:** The author has designed the SensaScope® in collaboration with the manufacturer Acutronic MS and is involved into the further development of the device. There are no financial interests involved except of funding of presentations of the equipment at scientific meetings.